

Mail Stop Interference
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Paper 64
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

SING H. **LEE** and WALTER DÄSCHNER
Junior Party¹
(Patent 6,107,000),

v.

CHE-KUANG **WU**
Senior Party²
(Application 09/934,218).

Patent Interference No. 105,326 (SCM)

Before: LEE, MEDLEY, and NAGUMO, Administrative Patent Judges.

NAGUMO, Administrative Patent Judge.

DECISION — PRIORITY — Bd.R. 125(a)

1 **A. Introduction**

2 The parties have each moved for judgment on priority.
3 Neither party requested oral argument. For the reasons
4 that follow, Lee Motion 2 (Paper 42) is GRANTED, and Wu
5 Motion 1 (Paper 46) is DENIED. Accordingly, adverse

¹ The real-party-in-interest is identified as the Regents of the University of California.

² The real-party-in-interest is identified as Canyon Materials, Inc.

1 judgment is entered AGAINST Wu in the JUDGMENT (Paper 65),
2 which is mailed on the same date as this DECISION.

3 The subject matter of this interference relates to a
4 method of photolithography in which the mask contains
5 regions having a continuously varying transmissivity.
6 According to the parties, this technology arises from the
7 recognition that a special kind of glass known as "High
8 Energy Beam Sensitive" ("HEBS") glass could be exposed or
9 written on with a 20-30 KeV electron beam, and that the
10 optical density (transmissivity) of the glass would be
11 related to the duration of exposure. After exposing a
12 layer of photoresist to actinic radiation through the mask,
13 the photoresist is developed, i.e., removed in proportion
14 to the transmissivity of the mask at each point. The
15 resulting structure has areas of continuously varying
16 height corresponding to the areas of continuously varying
17 transmissivity in the mask. It appears that the
18 continuously varying transmissivity distinguishes over the
19 prior art, which used discrete, stepped levels of
20 transmissivity, e.g., eight or sixteen levels of gray, to
21 define structures. Because only a single mask is used in
22 the disputed process of this interference, rather than many
23 masks, problems of registration of multiple masks are
24 avoided. According to the parties, these capabilities,

1 and the capability of removing exposed photoresist in
2 proportion to the degree of exposure on a very fine scale,
3 made the large scale production of Diffractive Optical
4 Elements ("DOE") and other structures requiring high
5 surface resolution readily accessible.

6 **B. Findings of Fact**

7 The following findings of fact³ as well as those
8 contained else where in this opinion are supported by a
9 preponderance of the evidence of record.

10 1. Lee is involved on the basis of U.S. patent 6,107,000
11 ("000 patent," LX 2001⁴) granted 22 August 2000, based on
12 original application 08/766,139, filed 17 December 1996.

13 2. The inventors for Lee are identified as Sing H. Lee
14 ("Dr. Lee") and Walter Däschner ("Däschner").

15 3. Wu is involved on the basis of application 09/934,218
16 ("218 application"), filed 21 August 2001.

17 4. Wu's 218 application is said to be a continuation-in-
18 part of application 09/507,039, filed 18 February 2000, now
19 U.S. Patent 6,562,523, which is in turn said to be a
20 continuation-in-part of application 08/961,459, filed

³ Any findings of law should be treated as such.

⁴ Lee exhibits are cited as "LX 2____." Wu exhibits are cited as
"WX 1____."

1 30 October 1997, now abandoned, which claims the benefit
2 under 37 C.F.R. § 119(e) of provisional application
3 60/030,258, filed 31 October 1996.

4 5. Wu has been accorded the benefit for priority of the
5 parent applications listed *supra*. (Paper 1 at 3.)

6 6. The inventor for Wu is identified as Che-Kuang Wu
7 ("Dr. Wu.")

8 7. The real-party-in-interest for Lee is identified as
9 the Regents of the University of California. (Paper 4.)

10 8. The real-party-in-interest for Wu is identified as
11 Canyon Materials, Inc. (Paper 13.)

12 9. The sole count is Count 1, which reads:

13 Lee patent 6,107,000 claim 6

14 or

15 Wu application 09/934,218, claim 5.

16 10. Lee claim 6 is worded identically to Wu claim 5 and is
17 as follows (emphasis added):

18 A method for producing various depth levels in a
19 layer of photoresist material including the steps
20 of:

21 exposing a layer of photoresist material to
22 radiation through a gray scale mask having areas
23 of continuously varying transmissivity;

24 removing photoresist material from said
25 photoresist layer to depth in said photoresist

1 layer at a predetermined position thereon
2 corresponding to a predetermined transmissivity
3 of said gray scale mask at a corresponding
4 predetermined position on said gray scale mask;
5 and

6 providing said gray scale mask as a glass
7 article comprising a body portion and an integral
8 ion exchanged surface layer which, upon exposure
9 to a high energy electron beam, becomes darkened
10 and is substantially insensitive to actinic
11 radiation.

12 11. The claims of the parties are:

13 Lee: 1-19

14 Wu: 1, 3-7, 9-12, 14-17, 19, and 20

15 12. All of the claims of both parties correspond to
16 Count 1. (Paper 1 at 4.)

17 13. The Lee 000 patent explains the significance of the
18 continuously varying transmissivity of the gray scale mask
19 in the following words: "Micro-optic devices such as micro-
20 lenses, wave guides and computer generated holograms, for
21 example, often require a geometry which is preferably a
22 continuously curved surface or which has a profile of
23 continuously varying depth from a reference point."

24 (LX 2001 at 4:36-40; emphasis added.)

1 14. Lee moved for judgment that it is entitled to priority.
2 (Lee Motion 2, Paper 42). Wu opposed (Paper 52) and Lee
3 replied (Paper 59).

4 15. Wu moved for judgment that it is entitled to priority.
5 (Wu Motion 1, Paper 46). Lee opposed (Paper 51) and Wu
6 replied (Paper 58).

7 16. Although both parties rely in part on the testimony of
8 inventors and other fact witnesses, neither party has
9 submitted cross-examination testimony of any declarant.

10 Lee's Priority Case

11 Lee Conception

12 17. Lee argues for a corroborated conception on
13 16 June 1995 when Däschner sent a facsimile to Dr. Wu
14 describing experiments conducted 14-16 June 1995, involving
15 the exposure of a photoresist sample using a gray level
16 mask [2Q8I88] provided by Dr. Wu, and the subsequent
17 development and characterization of the photoresist.
18 (Paper 42 at 13; LX 2005 at 5-8, ¶¶ 15-18, citing
19 Däschner's notebook (LX 2004) and the facsimile, LX 2008.)

20 18. Däschner testifies that "[t]his gray scale mask
21 exhibited areas of discrete transmissivity." (LX 2005 at 8,
22 ¶ 18.)

1 19. Däschner testifies further that after developing the
2 photoresist, he "determined the depth profile for each
3 position and recorded the results in nanometers of resist
4 on pages 41 and 42 of my Notebook [LX 2004] and faxed the
5 results on June 16, 1995, to Canyon Materials." (LX 2005
6 at 8, ¶ 18.)

7 20. None of Däschner's notebook pages are signed by
8 Däschner, nor are any pages witnessed (signed and dated) by
9 another.

10 21. Robert Stein testifies that he was the manager of the
11 electron beam facility in the Department of Electrical and
12 Computer Engineering at the University of California, San
13 Diego ("UCSD"), from July 1988 through October 1997.
14 (LX 2003 at 1, ¶ 1.)

15 22. Stein testified that he had become familiar with
16 Däschner's work and handwriting, and that he had reviewed
17 copies of pages 39-45, said to be from Däschner's notebook.
18 (LX 2003 at 1, ¶¶ 5-6.)

19 23. Stein testifies, "[b]ased on my familiarity with
20 Walter Daschner's handwriting and recordkeeping as well as
21 the work he was doing, it is my opinion that these notebook
22 pages are records in Walter Daschner's handwriting, and

1 that these are experiments he was conducting in the time
2 frames indicated thereon." (LX 2003 at 1, ¶ 7.)

3 24. Däschner's notebook page 41 bears an entry at the top
4 of the page of "05-09-95" and, just over half way down,
5 "06-14-95 Gray level mask w. Canyon Materials," followed by
6 a table of data captioned "darkest grey levels." (LX 2004
7 at 41.)

8 25. Däschner notebook page 42 begins with an undated table
9 of data captioned "lightest grey levels," followed by an
10 entry labeled "06-20." (LX 2004 at 42.)

11 26. Däschner's 16 June 1995 facsimile to Canyon Materials
12 reads in part:

13 [a]fter development I measured the remaining
14 resist in the areas with the grey-levels written
15 with 100 nA and written with 25 nA. As you can
16 see the [sic] especially the areas with the
17 lighter dosage came out very nice and we got a
18 almost linear curve up to about 0.30 coulomb/cm².
19 For our application this is almost perfect. I
20 will try to generate together with Rob some
21 patterns which will allow us to fabricate some
22 Diffraction Optical Elements.

23 (LX 2008 at 1; emphasis added.)

24 27. Däschner testifies:

25 This gray scale mask exhibited areas of discrete
26 transmissivity, and in my fax to Canyon Materials
27 I clearly envisioned making a gray scale mask
28 having areas of continuously varying
29 transmissivity because I mentioned that I would
30 generate patterns to fabricate Diffraction
31 Optical Elements, which would necessarily require

1 a pattern of continuously varying transmissivity
2 in the gray scale mask.

3 (LX 2005 at 8, ¶ 18.)

4 28. Lee argues that Däschner's facsimile corroborates a
5 second date of conception by showing that Däschner conveyed
6 the concept of exposing a photoresist through a
7 continuously varying gray scale mask.

8 29. Lee never argues that the gray scale mask used in the
9 experiments reported in the 16 June 1995 fax had areas of
10 continuously varying transmissivity.

11 30. Lee never argues that the 16 June 1995 fax
12 memorializes an actual reduction to practice.

13 Lee Actual Reductions to Practice

14 31. Däschner testifies that on 20 June 1995, he recorded
15 another experiment in his notebook (LX 2004 at 42) to make
16 a gray scale mask on HEBS glass. (LX 2005 at 8, ¶ 19,
17 citing .)

18 32. According to Däschner, on 21 June 1995, he appended a
19 four-page printout of a program from a PDP-11 computer that
20 drove the e-beam writer (LX 2004 at 42a-42d) together with
21 a graph of the resulting resist profile (LX 2004 at 42e).
22 (LX 2005 at 8, ¶ 19.)

1 33. Däschner testifies that pages 42a-42d "show the
2 location and intensity of each exposure in the e-beam
3 writer that was used to create the gray scale mask for a
4 lens." (LX 2005 at 8-9, ¶ 19.)

5 34. According to Däschner, "[a] variety of instructions
6 are provided to instruct the e-beam writer to make the gray
7 scale mask in the HEBS glass in the desired spherical and
8 linear patterns. [EXHIBIT 2004]. Thus, as of June 21,
9 1995, I had programmed the e-beam writer to make a gray
10 scale mask for fabricating a DOE." (LX 2005 at 9, ¶ 19.)

11 35. Lee argues several actual reductions to practice by
12 21 July 1995, 9 August 1995, 31 August 1995, and 29
13 November 1995. (Paper 42 at 14-17.)

14 36. We find it necessary to consider only Lee's argument
15 for an actual reduction to practice no later than
16 31 August 1995, based on the production of a diffraction
17 optical element on quartz. (Paper 42 at 15ff.)

18 37. Däschner testifies that in early August 1995, he made
19 a gray mask scale on a HEBS glass blank, having areas of
20 continuously varying transmissivity using an electron beam;
21 that the resultant mask was substantially insensitive to
22 actinic radiation; that he exposed a layer of photoresist
23 material through the mask and developed the material "to

1 depth at positions predetermined by the transmissivity of
2 the predetermined positions in the gray scale mask,
3 revealing the continuous nature of the DOE profile."
4 (LX 2005 at 9-10, ¶ 21.)

5 38. According to Däschner, he then transferred the profile
6 on the photoresist using chemically assisted ion beam
7 etching (CAIBE) to generate a DOE having a continuous
8 profile in quartz. (LX 2005 at 10, ¶ 21.)

9 39. The record indicates that CAIBE was a well known,
10 standard practice in the art by 1995. (See, e.g., LX 2001
11 at 3:55-58, recommending CAIBE for mass production.)

12 40. Däschner testifies that this was "a significant
13 accomplishment for me and others in our lab, and I conveyed
14 this result to Canyon Materials on August 31, 1995."
15 (LX 2005 at 10, ¶ 21.)

16 41. Lee relies in part on the testimony of Dr. Pin Long
17 ("Dr. Long") to corroborate the actual reduction to
18 practice by 31 August 1995. (Paper 42 at 8.)

19 42. Dr. Long testifies that he was a post-doctoral fellow
20 working in Dr. Lee's laboratory, and that he worked closely
21 with Däschner on projects involving the fabrication of

1 diffractive optical elements ("DOE") using gray level
2 masking approaches. (Lee declaration, LX 2006 at 2, ¶ 5.)

3 43. Dr. Long testifies that he remembers seeing Däschner
4 expose photoresist layers through a HEBS-glass plate gray
5 scale mask having a pattern of areas of continuously
6 varying transmissivity, develop the photoresist material,
7 and remove it. (LX 2006 at 3, ¶ 7.)

8 44. In Dr. Long's words, "I remember looking with Walter
9 Daschner at the resulting depth levels in the layer of
10 quartz photoresist as this was the first demonstration of a
11 DOE using the new process, and this was by the end of
12 August 1995."

13 45. Lee also relies on a document labeled as "Report No.
14 95-108", styled "Joint Efforts of CMI and UCSD on the
15 Fabrication of HEBS Glass Gray Level Mask for DOE
16 Fabrication," authored by Che-Kuang Wu, under Canyon
17 Materials, Inc., letterhead, dated "1/26/96" (LX 2015,
18 hereafter, "CMI Report"), for corroboration. (Paper 42
19 at 15.)

20 46. The CMI Report states, "[o]n 8/31/95 Walter Daschner
21 told me he made DOE in quartz using HEBS-gray level mask."
22 (LX 2015 at 4, 2d full paragraph.)

1 47. The last page of Däschner's notebook offered in
2 evidence is labeled "07-24-95" (LX 2004 at 45), which we
3 read as 24 July 1995.

4 Wu's Opposition

5 48. Wu, who appears *pro se*, has filed an Opposition to Lee
6 Motion 2 (Paper 52) that does not conform to standard
7 practice before the Board as set out in the Standing Order
8 (Paper 2) at ¶ 122.3.

9 49. The majority of Wu's opposition brief is devoted to a
10 recitation of Wu's case-in-chief for priority.

11 50. Wu does not appear to dispute Lee's account, including
12 the testimony of Däschner or Dr. Long, except to the extent
13 that they imply that they were working essentially
14 independently of Dr. Wu.

15 51. For example, regarding the quartz DOE Däschner relates
16 having made, Wu argues:

17 Wu also provided the N201K HEBS-glass plate
18 subsequently used by Mr. Daschner to make a HEBS-
19 glass gray scale mask. (EXHIBIT 1005 ¶ 41). That
20 gray scale mask was in turn used to expose
21 photoresist and to subsequently produce a
22 complete DOE in quartz. (EXHIBIT 1005 ¶ 41).
23 Those further activities by Mr. Daschner were at
24 the direction of Wu, and constitute further
25 corroborated actual reductions to practice of
26 Wu's invention of Count 1. (EXHIBIT 1005 ¶ 38).

27 (Paper 52 at 15; emphasis added.)

1 Wu's Priority Case

2 52. Wu urges that it proves conception no later than
3 13 April 1995, when Dr. Wu allegedly described the
4 invention to Stein. (Paper 46 at 7.)

5 53. More particularly, Dr. Wu testifies that he told Stein
6 about its idea of using a "suitably written HEBS-glass
7 plate" as a gray scale mask that would "permit the mass
8 production of optical elements such as diffractive optical
9 elements." (Wu Declaration, WX 1005 at 10-11, ¶ 24.)

10 54. Wu does not direct our attention to testimony by
11 Dr. Wu that he envisioned or described to Stein a gray-
12 scale mask having areas of continuously varying
13 transmissivity.

14 55. Wu urges further that Stein corroborates Dr. Wu's
15 conception. (Paper 46 at 7.)

16 56. Dr. Wu testifies further that he asked Stein to
17 "identify to me individuals in the Department who would be
18 willing to use my HEBS-glass gray scale mask to make a
19 diffractive optical element." (WX 1005 at 10-11, ¶ 24.)

20 57. According to Stein, he met with Dr. Wu on or about
21 13 April 1995, when Dr. Wu showed him a glass plate having
22 "uniformly darkened square patches clearly visible as
23 having different gray scale levels." (WX 1007 at 1, ¶ 4.)

1 58. Stein testifies that "Dr. Wu explained that the HEBS-
2 glass plate could be used as a gray scale mask, which could
3 be used in a subsequent step to expose photoresist in a
4 substrate. Dr. Wu explained that a gray scale mask
5 constructed using HEBS-glass would permit the manufacture
6 of large numbers of micro-optical elements, such as
7 diffractive optical elements." (WX 1007 at 2, ¶ 5.)

8 59. Stein does not testify that Dr. Wu described a process
9 involving the step of "exposing a layer of photoresist
10 material through a gray-scale mask having areas of
11 continuously varying transmissivity."

12 60. Stein testifies further that "Dr. Wu also asked me to
13 identify an individual in the Department who would be
14 willing to use his HEBS-glass gray scale mask to print on
15 photoresist." (WX 1007 at 2, ¶ 5.)

16 61. According to Dr. Wu, Stein prepared a gray scale
17 pattern on a HEBS-glass plate ("HEBS-glass gray scale mask
18 2Q8I88") by 24 May 1995, following Wu's instructions.
19 (WX 1005 at 12, ¶ 29.)

20 62. According to Stein, between 14 April 1995, and 24 May
21 1995, he exposed a HEBS-glass plate according parameters
22 specified by Dr. Wu, and that he believes the mask 2Q8I88
23 is the plate that he exposed. (WX 1007 at 2, ¶ 7.)

1 63. Stein testifies that he examined the plate with a
2 reflection mode microscope, but, because he did not have a
3 transition mode microscope, he could not see gray scale
4 levels within the gray scale patterns. (WX 1007 at 3,
5 ¶ 8.)

6 64. Stein testifies further, "I returned the written plate
7 to Dr. Wu and he took photomicrographs of the mask patterns
8 with 16 gray levels written in the plate 2Q8I88 for some of
9 the combinations of the writing parameters." (WX 1007 at 4,
10 ¶ 11; emphasis added.)

11 65. Dr. Wu identifies WX 1014 as a 1x photocopy of mask
12 2Q8I88. (WX 1005 at 12-13, ¶ 30.)

13 66. Dr. Wu testifies that he took some 50x transmission
14 mode photomicrographs of the gray scales to show the
15 16 gray scale levels within one gray scale pattern.
16 (WX 1005 at 13, ¶ 31.)

17 67. Although Dr. Wu does not expressly say so, it appears
18 that these 50x photomicrographs have been provided as Wu
19 Exhibit 1015.

20 68. Dr. Wu testifies further that, pursuant to his request,
21 Stein showed the HEBS-glass gray scale mask 2Q8I88 and some
22 photomicrographs (WX 1015) of the gray scales to Däschner.
23 (WX 1005 at 13-14, ¶ 33.)

1 69. According to Stein, in May 1995, "I explained to
2 Mr. Daschner the properties of HEBS-glass that Dr. Wu
3 described to me . . . I mentioned to Mr. Daschner that
4 Dr. Wu hoped to find someone in Dr. Lee's micro optics
5 group who is able and willing to print the gray scale
6 patterns in the HEBS-glass plate to produce various depth
7 levels in a layer of photoresist corresponding to various
8 gray scale levels in the HEBS-glass mask." (WX 1007 at 3,
9 ¶ 10.)

10 70. Stein testifies that he reviewed the photomicrographs
11 of Exhibit 1015, and that he believes they are the
12 photomicrographs of the mask 2Q8I88 that he showed Däschner.
13 (WX 1007 at 3, ¶ 9.)

14 71. Stein does not testify that he described to Däschner a
15 process involving the step of "exposing a layer of
16 photoresist material through a gray-scale mask having areas
17 of continuously varying transmissivity."

18 72. According to Dr. Wu, Däschner called him after seeing
19 the mask and the photomicrographs to arrange a meeting "to
20 discuss the project further." (WX 1005 at 14, ¶ 33.)

21 73. Dr. Wu testifies that he met with Däschner at UCSD on
22 12 June 1995 at 10:00 a.m., and that Däschner "agreed to
23 expose a layer of photoresist material through the gray

1 scale mask 2Q8I88 to produce various depth levels in the
2 layer of photoresist." (WX 1005 at 14, ¶ 33.)

3 74. Dr. Wu does not testify that he informed Däschner that
4 the gray scale mask 2Q8I88 contained areas of continuously
5 varying transmissivity.

6 75. Wu does not direct our attention to any credible
7 evidence that the etched photoresist layer created by
8 Däschner has areas of continuously varying height.

9 76. Wu does not direct our attention to any credible
10 corroborating evidence in support of his account of his
11 meeting with Däschner on 12 June 1995.

12 77. According to Dr. Wu, he provided Däschner with a
13 3" x 3" portion of plate 2Q8I88 on or before 14 June 1995,
14 that would fit the device (a "contact aligner") Däschner
15 would use to expose a photoresist. (WX 1005 at 14-15,
16 ¶ 36.)

17 78. Dr. Wu testifies that the gray scale pattern on the
18 3" x 3" mask from 2Q8I88 has areas of continuously varying
19 transmissivity, as shown on sheets 1 and 5 of WX 1015,
20 written with clock rates 10 through 16, using 25 na beam
21 current at 30 kV beam acceleration, and written with clock
22 rates 1 through 8 using 200 na beam current at 30 kV beam
23 acceleration voltage, respectively. (WX 1005 at 19, ¶ 43.)

1 79. Dr. Wu does not present any quantitative data derived
2 from the photomicrographs shown in WX 1015, such as
3 densitometer traces.

4 80. It is not apparent to us, from our examination of
5 WX 1015, as it has been provided to us (on a CD-ROM disk),
6 that there are areas of continuous variation in the bands
7 parallel to the labels "CLK 10 5.5E6," etc., on sheet 1 of
8 WX 1015, or at corresponding positions on sheet 5 of
9 WX 1015.

10 81. Nor is it apparent to us that any variations in gray
11 correspond to variations in the original 3" x 3" gray scale
12 mask on sample 2Q8I88, or to the vagaries of subsequent
13 reproductions.

14 82. Dr. Wu testifies that Däschner faxed him a letter (a
15 copy has been filed as WX 1022) on 16 June 1995 describing
16 the exposure and development of a photoresist sample with
17 the gray level mask 2Q8I88. (WX 1005 at 15, ¶ 37.)

18 83. Wu Exhibit 1022 appears to be identical to Lee
19 Exhibit 2008.

20 84. Wu urges that it proves an actual reduction to
21 practice via the activities of Walter Däschner ("Däschner")
22 on 14-16 June 1995. (Wu priority brief at 10-11.)

1 85. According to Wu, Däschner carried out those activities
2 at Wu's request, under Wu's direction. (Wu priority brief
3 at 11.)

4 **C. Discussion**

5 The senior party in an interference is presumed to
6 have been the first to invent the subject matter of the
7 Count. Bd.R. 207(a). Accordingly, Lee has the burden of
8 proving, by a preponderance of the evidence, that it
9 reduced an embodiment within the scope of the Count prior
10 to Wu's accorded benefit date. Bd.R. 121(b). If Lee's
11 priority motion is not granted, we need not consider Wu's
12 priority motion, and may directly enter adverse judgment
13 against Lee. However, if Lee's motion is granted, we must
14 consider Wu's motion for priority to see whether Wu proves
15 a date of actual reduction to practice prior to Lee.

16 (Although both Lee and Wu alleged diligence, neither
17 provided, as required by the Standing Order, a day-by-day
18 account of the inventors' activities, with explanations of
19 any periods of inactivity. S.O. 208.6 (Paper 2). Without
20 a rigorous accounting of activities purportedly proving
21 diligence, including explanations of any periods of
22 inactivity or periods during which other projects were
23 pursued, we are not put in a position to find sufficient

1 facts to support a conclusion that the activities leading
2 to a reduction to practice were pursued with reasonable
3 diligence under the circumstances. To put it another way,
4 we are not able to find whether periods of inactivity on
5 this project are excusable, or whether they should be
6 charged to a lack of diligence. Under these circumstances,
7 we need not probe the parties' cases for conception, except
8 incidentally, to ensure that the alleged reduction to
9 practice satisfies the requirements that every limitation
10 of the Count was met and that the embodiment worked for its
11 intended purpose.)

12 In the present case, proof of actual reduction to
13 practice requires proof that a process within the scope of
14 the Count was conducted, and that it worked for its
15 intended purpose. *Cooper v. Goldfarb*, 154 F.3d 1321, 1327,
16 47 USPQ2d 1896, 1901 (Fed. Cir. 1998). An inventor's
17 testimony as to inventive facts must be corroborated by
18 evidence independent of the inventor. *Brown v. Barbacid*,
19 276 F.3d 1327, 1335, 61 USPQ2d 1236, 1240 (Fed. Cir. 2002)
20 ("an inventor's testimonial assertions of inventive facts
21 require corroboration by independent evidence.") The
22 reason for this rule is due to "the concern that a party
23 claiming inventorship might be tempted to describe his

1 actions in an unjustifiably self-serving manner in order to
2 obtain a patent or to maintain an existing patent." *Chen v.*
3 *Bouchard*, 347 F.3d 1299, 1309, 68 USPQ2d 1705, 1712 (Fed.
4 Cir. 2003). As the Federal Circuit has repeatedly reminded
5 us, "[t]he tribunal must also bear in mind the purpose of
6 corroboration, which is to prevent fraud, by providing
7 independent confirmation of the inventor's testimony."
8 *Price v. Symsek*, 988 F.2d 1187, 1194-95, 26 USPQ2d 1031,
9 1036 (Fed. Cir. 1993). An inventor, of course, need not be
10 the one who actually reduces an invention to practice.
11 *Cooper*, 154 F.3d at 1331, 47 USPQ2d at 1904-05
12 ("experiments conducted at the request of an inventor by
13 another party may inure to the benefit of the inventor for
14 purposes of establishing a reduction to practice."
15 (Citation omitted).)

16 Lee's case for Actual Reduction to Practice

17 Lee's case for actual reduction to practice is
18 encumbered by a relatively scant record of primary evidence
19 (such as laboratory notebooks that are signed, dated, and
20 reasonably promptly witnessed) in support of its arguments.
21 Accordingly, we shall examine only the most fully developed
22 argument, namely, that Däschner achieved an actual

1 reduction to practice of an embodiment within the scope of
2 the Count by 31 August 1995.

3 Lee claim 6 or Wu claim 5, which are identically
4 worded, define the Count and read (bracketed labels added):

5 A method for producing various depth levels in a
6 layer of photoresist material including the steps
7 of:

8 [2] exposing a layer of photoresist material
9 to radiation through a gray scale mask having
10 areas of continuously varying transmissivity;

11 [3] removing photoresist material from said
12 photoresist layer to depth in said photoresist
13 layer at a predetermined position thereon
14 corresponding to a predetermined transmissivity
15 of said gray scale mask at a corresponding
16 predetermined position on said gray scale mask;
17 and

18 [1] providing said gray scale mask as a
19 glass article comprising a body portion and an
20 integral ion exchanged surface layer which, upon
21 exposure to a high energy electron beam, becomes
22 darkened and is substantially insensitive to
23 actinic radiation.

24 Rearranging the verbiage slightly for clarity, the method
25 defining the commonly claimed subject matter has three
26 steps: [1] providing a gray scale mask having certain
27 properties, the most important of which is that it has
28 areas of continuously varying transmissivity; [2] exposing

1 a layer of photoresist material to actinic radiation
2 through the gray-scale mask; and [3] developing the exposed
3 photoresist layer and removing exposed photoresist to a
4 depth corresponding to the transmissivity of the gray scale
5 mask at any given location.

6 The Lee 000 patent explains the significance of the
7 continuously varying transmissivity of the gray scale mask
8 in the following words: "Micro-optic devices such as
9 micro-lenses, wave guides and computer generated holograms,
10 for example, often require a geometry which is preferably a
11 continuously curved surface or which has a profile of
12 continuously varying depth from a reference point."
13 (LX 2001 at 4:36-40.)

14 Däschner testifies that no later than 31 August 1995,
15 he made a gray scale mask having areas of continuously
16 varying transmissivity by exposing a HEBS-glass blank to an
17 electron beam, and that he then exposed a layer of
18 photoresist through the mask and developed the exposed
19 photoresist in such a way that photoresist was removed to a
20 depth that corresponded to the transmissivity of the gray
21 scale mask. Dr. Long testifies that he saw Däschner
22 perform these activities, and Wu accepts that these
23 activities were conducted as described.

1 We find Däschner's testimony credible. Although
2 Däschner's notebook is unsigned and unwitnessed, Dr. Long
3 and Stein testified that they recognized the handwriting as
4 his, and that the contents reflected the experiments he was
5 conducting at the times indicated in the notebooks.
6 Although we need not determine the merits or relevance of
7 those notebook entries with respect to actual reduction to
8 practice, we find that they show Däschner to know whereof
9 he speaks. We find Dr. Long's corroborating testimony
10 credible. Dr. Long testifies that he worked in Dr. Lee's
11 lab at the same time on similar problems, sometimes in
12 collaboration with Däschner. We find that Dr. Long was
13 both knowledgeable in the relevant arts and well-positioned
14 to see and evaluate Däschner's work. Finally, we note that
15 Wu does not dispute that Däschner did what Däschner says he
16 did, when he says he did it.

17 Comparing Däschner's activities to the steps recited
18 in the Count, we find that there is no dispute that they
19 correspond to the three steps outlined above, and that the
20 parties do not dispute that all other limitations required
21 of the gray scale mask were fully met. Accordingly, we
22 conclude that Lee proved an actual reduction to practice no
23 later than 31 August 1995, well before Wu's accorded

1 benefit date of 31 October 1996. In doing so, we leave
2 open for the moment the question of whether Däschner was
3 acting independently of Dr. Wu.

4 As we have noted, Wu does not contradict any aspect of
5 Lee's argument for its alleged actual reduction to practice
6 except for the alleged independence of Däschner from Dr. Wu.
7 Accordingly, we now turn to Wu's case in chief for priority
8 and evaluate Wu's arguments there.

9 Wu's case for Actual Reduction to Practice

10 Wu has the burden of proving, by a preponderance of
11 the evidence, that Däschner was working on behalf of Dr. Wu.
12 Moreover, Wu has the burden of showing that Däschner
13 reduced to practice an embodiment within the scope of the
14 Count no later than 16 June 1995, when Däschner faxed the
15 report that Lee regards as an alternative proof of
16 conception, but not of an actual reduction to practice. We
17 observe that if Wu shows that Däschner learned the disputed
18 invention from Dr. Wu, then, on the present record, all of
19 Däschner's alleged reductions to practice should inure to
20 Wu, as all have been argued to be realizations of the Count.

21 We first consider Wu's arguments that Däschner learned
22 of the invention from Dr. Wu and was working under Dr. Wu's
23 direction. Wu has relied principally on the testimony of

1 inventor Dr. Wu. The problem is that Wu has failed to come
2 forward with evidence independent of the inventor that
3 corroborates the inventor's testimony. In particular, Wu
4 has failed to provide evidence corroborating Dr. Wu's
5 testimony that Däschner was working at the behest of Wu.
6 Without impugning Dr. Wu's motivation or perceptions in
7 this regard, there is no basis in the Law for us to accept
8 his word without independent corroboration. We have not
9 been directed to any contemporaneous documents in the
10 record memorializing any agreements or communications
11 between Dr. Wu and Dr. Lee or Däschner or Stein. The
12 failure to corroborate communication of instructions, e.g.,
13 on 12 or 14 June 1995, is also fatal to Wu's argument that
14 Dr. Lee and Däschner derived the invention from Dr. Wu.

15 Moreover, Wu has failed to prove conception of a
16 process within the scope of the Count prior to the alleged
17 actual reductions to practice in June or in August 1995.
18 Because conception is a mental act by the inventor, proof
19 of conception requires a manifestation of that act that
20 stands independently of the inventor and that demonstrates
21 that the inventor indeed had thought of an embodiment of
22 the invention meeting every limitation of the Count. Here,
23 Wu has failed to prove that he had conceived of every

1 limitation of the Count, in particular, the limitation that
2 the gray scale mask must contain "areas of continuously
3 varying transmissivity." Wu does not explain how this
4 limitation is inherent or evident in Dr. Wu's description
5 to Stein. Nor does Stein testify that he understood Dr. Wu
6 to have conveyed to him the idea of areas of continuously
7 varying transmissivity.

8 In this regard, we find that Lee's arguments in
9 opposition, that Wu conveyed no more than what is taught in
10 Wu's prior U.S. patent 5,078,771 (LX 2021), have some
11 merit.⁵ For example, the 771 patent teaches that "[t]he HEBS
12 glass articles are useful as high energy beam recording
13 media for permanent storage of images or data having a full
14 range of gray scales." (LX 2021 at 5:42-44.) The 771
15 patent also teaches that "[w]ithin at least one surface of
16 a glass filter of the present invention, the optical
17 density at any point or any portion of the surface area may
18 have a value independent of adjacent points or areas
19 ranging from zero to more than 3." (LX 2021 at 42:20-24.)
20 Moreover, the 771 patent concludes that "[t]he above
21 experiments also demonstrate that the minimum geometries,

⁵ Wu's 771 patent is cited on the face of Lee's involved 000 patent. We presume, without deciding (the parties not having raised the issue), that the Count and claims of the parties are patentable over the disclosure of the 771 patent.

1 e.g., line width, that can be delineated in the products of
2 the present invention is less than 1 micrometer and most
3 likely less than 0.8 micrometer." (LX 2021 at 62:60-64.)
4 At least in hindsight, it appears to be a very small step
5 from making a full range of discrete (stepped) gray scales,
6 with independent values of optical density at adjacent
7 points or areas and using those gray scales to make
8 features on the scale of microns, to making gray scales
9 having "areas of continuously varying transmissivity" and
10 using them to make features having continuously varying
11 (rather than stepped) heights. But, not being directed by
12 Wu to any credible evidence that Dr. Wu had taken that step
13 before 23 April or 16 June 1995, we shall not infer what is
14 Wu's burden to prove.

15 In this regard, we accord no weight to Stein's
16 testimony. Although Stein testifies as to his "surprise"
17 Däschner "claims to have thought of using the HEBS-glass to
18 make gray scale masks, since that is exactly the process
19 that I had told him Dr. Wu had developed" (WX 1007 at 3-4,
20 ¶ 10), Stein does not testify that Dr. Wu explained to him
21 that the creation of gray scale masks with areas of
22 continuously varying transmissivities (as opposed to
23 adjacent areas having discrete transmissivities) was part

1 of Wu's invention. Nor does Stein testify that he
2 explained this feature of the invention to Däschner as part
3 of Wu's invention. Stein's testimony that he is "not
4 familiar with the legal requirements for being declared an
5 inventor on a patent" (WX 1007 at 4-5, ¶ 14) is well
6 verified by his silence as to this critical limitation of
7 the Count.

8 Finally, we conclude that Wu has failed to show that
9 the mask 2Q8I88 Däschner used in the exposure and
10 subsequent etching reported in his facsimile transmission
11 of 16 June 1995 has areas of continuously varying
12 transmissivity, and that the procedures Däschner carried
13 out resulted in an etched photoresist having areas of
14 continuously varying depth corresponding to the pattern on
15 the gray scale mask. Dr. Wu's testimony that bands
16 corresponding to CLK 10 through 16 on sheet 1 of Wu
17 Exhibit 1015, and that bands corresponding to CLK 1 to 10,
18 written at 30 kV beam acceleration voltage shown on sheet 5
19 of Wu Exhibit 1015, is intriguing, but we are unable to see
20 that this is the case given the record before us. There is
21 no quantitative measure of the optical density (e.g., no
22 densitometer traces), and Dr. Wu does not testify in
23 sufficient detail to permit us to conclude that any

1 variations in the figures are continuous variations in
2 transmissivity in the original glass masks, or vagaries of
3 reproduction of the exhibit. Nor has Wu directed our
4 attention to any evidence that the etched photoresist layer
5 had corresponding regions of continuously varying depth.

6 Accordingly, Wu Motion 1 for priority is DENIED.

7 **E. Order**

8 In view of the foregoing findings of fact and
9 considerations, it is:

10 ORDERED that Lee Motion 2 is GRANTED.

11 FURTHER ORDERED that Wu Motion 1 is DENIED.

12 FURTHER ORDERED that a copy of this DECISION
13 shall be entered in the records of U.S. Patent 6,107,000
14 and U.S. Application 09/934,218.

15 FURTHER ORDERED that the attentions of the
16 parties are directed to the JUDGMENT entered in Paper 65,
17 which is mailed on the same date as this DECISION.

1 FURTHER ORDERED that if a settlement is reached,
2 the attentions of the parties are drawn to 35 U.S.C.
3 § 135(c) and Bd.R. 205.

<u>/ss/ Jameson Lee</u>)	
JAMESON LEE)	
Administrative Patent Judge)	
)	
)	BOARD OF
<u>/ss/ Sally C. Medley</u>)	PATENT APPEALS
SALLY C. MEDLEY)	AND
Administrative Patent Judge)	INTERFERENCES
)	
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